

Npaq 6U Series

High-Power Drive Racks

High-power 6U modular drive chassis

19 inch rack-mount design

Flexible design provides the ability to drive brush, brushless or stepper motors with the same amplifier

5 A to 30 A peak output current

PWM or linear amplifiers

Integral power supplies

IEEE-1394 FireWire® interface

Digital current, velocity and position loops for improved motion stability

Optional Ethernet for I/O expansion

Integrated encoder multiplier for higher throughput and reduced wiring

Encoder and resolver feedback

CE approved and NRTL safety certification; follows the 2011/65/EU RoHS 2 Directive

The Npaq® 6U is designed for applications that exceed the power capacity of Aerotech's 3U Npaq. The Npaq 6U can be configured with higher wattage transformers and a larger capacity linear amplifier that provides a nearly two-fold increase in power over the similarly configured 3U version.

Featuring high-performance, double-precision DSPs, the Npaq family performs both current loop and servo-loop closures digitally to ensure the highest level of positioning accuracy and rate stability. It is this processing capability that allows the Npaq to provide loop closure rates up to 20 kHz and to handle both digital and analog I/O processing, data collection, laser firing and encoder multiplication tasks in real time.

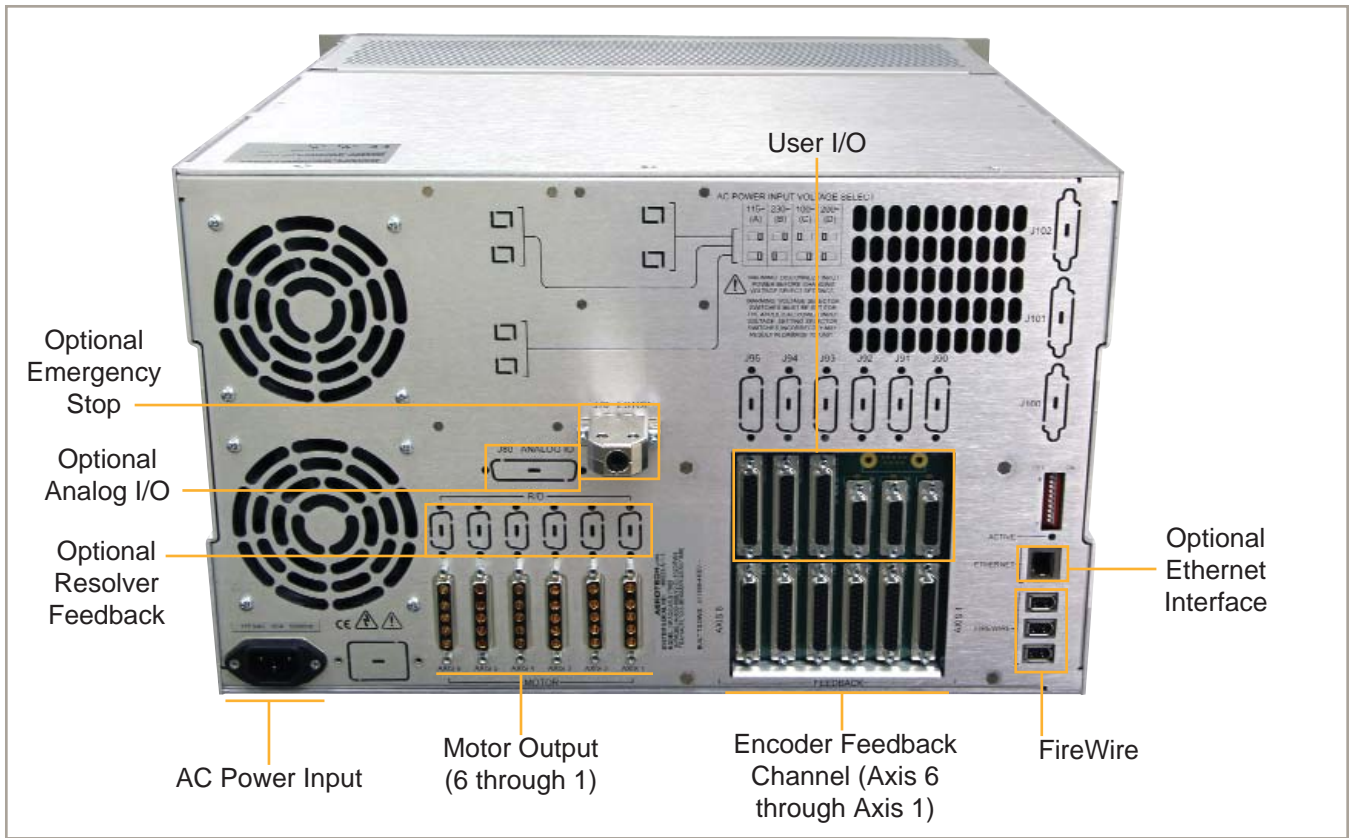


Npaq 6U high-power drive rack.

Standard options for the Npaq family include integrated encoder multiplication, per-axis brake control logic, I/O expansion and integrated emergency stop circuitry. The Npaq uses plug-in amplifiers supporting both linear and PWM topologies to control brushless, DC brush or stepper motors at up to 320 VDC operating voltage and 30 A peak current capability.

The linear amplifier in the Npaq 6U has twice the output power of the 3U version (80 V and 20 A peak versus 40 V and 10 A peak) for high power, low noise applications. The Npaq contains two configurable power supply sections rated at 600 W each to support a variety of motors with different operating voltages. When only one motor voltage is required the power supply sections are joined together for even higher power capability.

The Npaq has a dedicated Ethernet port to communicate with third-party I/O modules for increased I/O count applications. The Npaq supports up to three axes of Position Synchronized Output (PSO) for precise synchronizing of external devices, over-voltage shunt controller and external fans for high-power operation.



Amplifiers	DP32010E6U	DP32020E6U	DP32030E6U	DL40106U	DL8010	DL8020
Control Type	Brushless, DC Brush, Stepper					
Output Type	PWM	PWM	PWM	Linear	Linear	Linear
Output Voltage (VDC)	10-320	10-320	10-320	10-40 (Bipolar)	10-80 (Bipolar)	10-80 (Bipolar)
Continuous Current	5	10	10	5 ⁽¹⁾	5	10
Peak Current	10	20	30	10 ⁽¹⁾	10	20
Minimum Load ⁽²⁾	0.1 mH	0.1 mH	0.1 mH	0 ohms	0 ohms	0 ohms
Protection	Short Circuit Protection; Overload Protection; Low Level Power Supply Detection and Fuse					
Switching Frequency	20 kHz	20 kHz	20 kHz	N/A	N/A	N/A

Notes:

1. Actual current ratings dependent on motor resistance

2. Minimum load is based on output voltage; 0.1 mH is minimum load at 160 VDC, 1.0 mH at 320 VDC

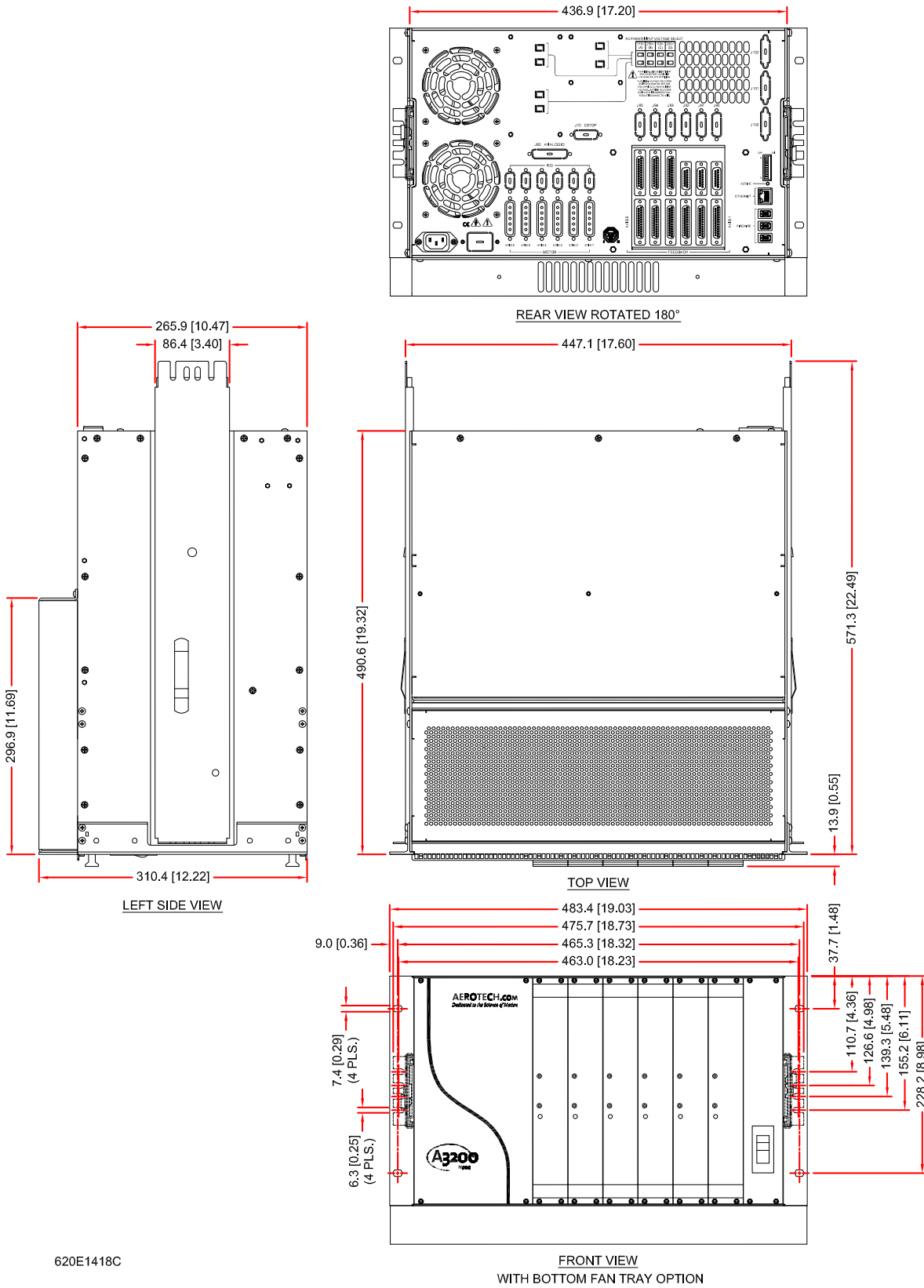
Npaq 6U Series SPECIFICATIONS

	Units	Npaq 6U
Number of Axes		1 to 6
Encoder Inputs		1 to 6; Additional Through High Speed Input
Motor Style		Brush, Brushless, Stepper
Power Supply	VAC	Single-Phase 100-240 VAC; 50/60 Hz (Factory Configured)
Bus Voltage	VDC	10-320
Peak Output Current (1 sec) ⁽¹⁾	A _{pk}	10, 20, 30
Continuous Output Current ⁽¹⁾	A _{pk}	5, 10, 10
Digital Inputs		Eight Optically-Isolated
Digital Outputs		Eight Optically-Isolated
Analog Inputs		Four 16-bit Differential; ±1 V to ±10 V
Analog Outputs		Two 16-bit Single-Ended; ±10 V
Dedicated Axis I/O on Feedback Connector		Three Limit Inputs (CW, CCW, Home); Three Hall Effect Inputs (A, B, C); Three HighSpeed Differential Inputs (sin, cos, mkr for encoder); Motor Over-Temperature Input
Dedicated I/O on Auxiliary Feedback Connector		N/A
I/O Expansion Board ⁽²⁾		Four Analog Input; Six Analog Output
High Speed Data Capture		Four Differential Inputs (1 μs Response Time)
High Speed Digital Outputs		Six Differential Outputs
Bi-Directional Lines		3
Automatic Brake Control		Optional
Emergency Stop (ESTOP)		Optional
Position Synchronized Output (PSO)		Single Axis Standard, Two/Three Axis Optional
Can Output Multiplied Encoder		Yes
Can Output Square Wave Encoder		Yes
Primary Encoder Input Frequency with Multiplication		450 kHz or 2 MHz sine wave (MXH)
Primary Encoder Input Frequency – Square Wave		10 MHz Square Wave Frequency/40 MHz Count Rate
Secondary Encoder Input Frequency		10 MHz Square Wave Frequency/40 MHz Count Rate
Laser Feedback Support		Yes
Encoder Multiplication ⁽³⁾		Up to x65536 With Quadrature Output (MXR)
Resolver/Inductosyn Interface		Optional; 1 or 2 Channel; 16-bit
Internal Shunt Resistor		40 W Continuous; 400 W Peak (5 seconds)
External Shunt		Optional
Ethernet		Optional
USB		No
RS-232 No		No
FireWire		Yes
Fieldbus		Modbus TCP on PC
Joystick Support		Yes
Current Loop Update Rate	kHz	20
Servo Loop Update Rate	kHz	8
Power Amplifier Bandwidth	kHz	Selectable Through Software
Minimum Load Inductance	mH	0.1 mH with PWM; 0 With Linear
Operating Temperature	°C	0 to 50
Storage Temperature	°C	-30 to 85
Weight	kg (lb)	43.6 (96)
Package		Slice Amplifier Installed in Front
Standards		CE approved, NRTL safety certification, 2011/65/EU RoHS 2 Directive

Notes:

1. Peak value of the sine wave; rms current for AC motors is 0.707 * A_{pk}.
2. Requires I/O option.
3. Effective resolution after quadrature decoding if applicable.

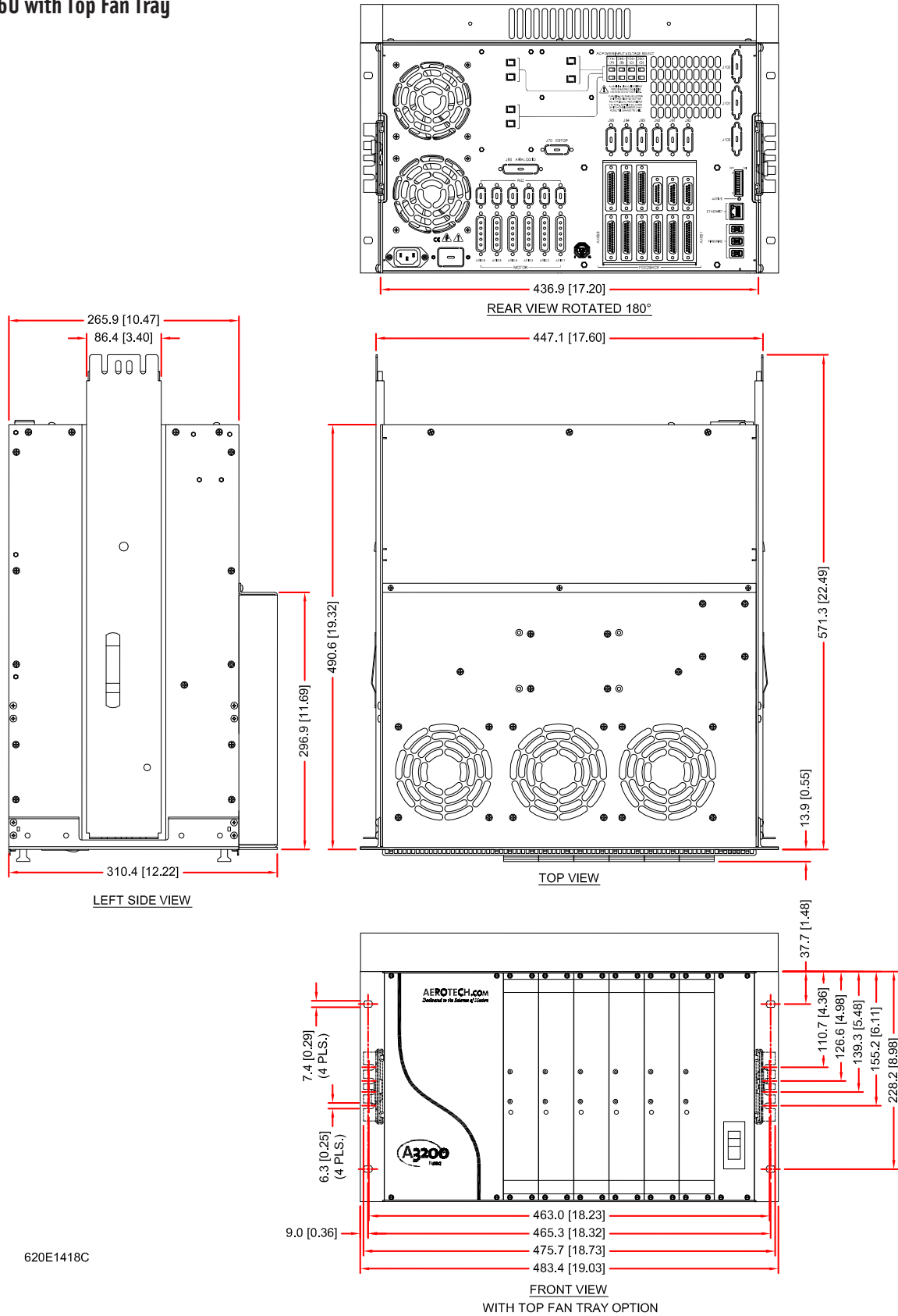
Npaq 6U with Bottom Fan Tray



620E1418C

Npaq 6U Series DIMENSIONS

Npaq 6U with Top Fan Tray



Npaq 6U Series ORDERING INFORMATION

Ordering Example: Required

Npaq 6U	-A	-10B	-0	-ULTRA	-1-DL40106U	-NO SPLIT	-FAN TRAY TOP	-US-115VAC
Base	Power Input	Vbus1	Vbus2	Controller Options	Amp1-6	Split Bus	Cooling	Linecord
	-A	-0	-0	-ULTRA	-DP32010E6U	-Split Bus 1/2-6	-FAN TRAY TOP	-ENGLAND
	-B	-10B	-10B		-DP32020E6U	-Split Bus 1-2/3-6	-FAN TRAY BOTTOM	-GERMANY
	-C	-20B	-20B		-DP32030E6U	-Split Bus 1-3/4-6		-ISRAEL
	-D	-30B	-30B		-DL40106U	-Split Bus 1-4/5-6		-INDIA
		-40B	-40B		-DL4005A6U	-Split Bus 1-5/6		-AUSTRALIA
		-60B	-60B		-DL4010A6U	-Split Bus 1-6		-US-115VAC
		-80B	-80B		-DL8010	(NO SPLIT)		-US-230VAC
		-160LT	-160LT		-DL8020			-NO-LINECORD
		-320LT	-320LT		-BLANK6U			

-SLIDES	-BRAKE-z	-AC LINE FILTER	-ENET	-	-MXR-1	-LINESEL-INT	-M1	-RDP2-y
Mounting Options	Brake	Line Filter	Options	PSO Options	Encoder Multiplier Options	Line Select Options	Motor Output	Resolver Options
-SLIDES	-BRAKE-z -BRAKEIO	-AC LINE FILTER	-JI -ENET -ESTOP1 -ESTOP2 -ESTOP3 -S160-1 -S160-2 -S320-1 -S320-2 -AIO -BC1	-DUALPSO -TRIPLEPSO -PSO-NC	-MXR-1 -MXR-2 -MXR-3 -MXR-4 -MXR-5 -MXR-6 -MXR2M-1 -MXR2M-2 -MXR2M-3 -MXR2M-4 -MXR2M-5 -MXR2M-6	-LINESEL-INT -LINESEL-MX-INT -LINESEL-EXT -LINESEL-MX-EXT	-M1 -M2 -M3 -M4 -M5 -M6	-RDP2-y -RDP4-y -RDP6-y

Npaq 6U

Npaq 6U 6U rack-mount, high power, digital amplifier chassis with integral DC power supply and FireWire® interface. Supports up to 6 axes of brush, brushless or stepper motor amplifiers. Includes:

- 8 opto-isolated digital inputs
- 8 opto-isolated digital outputs
- 4 16-bit differential analog inputs
- 2 16-bit analog outputs
- ESTOP sense input
- 6 channels of 40 MHz quadrature encoder input (analog input optional)

Power Input (Required)

-A	115 VAC
-B	230 VAC
-C	100 VAC
-D	208 VAC

Bus Voltage (Vbus1) (Required) Configures the Bus Voltage for Vbus1

-0	Not wired
-10B	±10 VDC (200 W power supply), bipolar
-20B	±20 VDC (200 W power supply), bipolar
-30B	±30 VDC (600 W power supply), bipolar
-40B	±40 VDC (600 W power supply), bipolar
-60B	±60 VDC (600 W power supply), bipolar
-80B	±80 VDC (600 W power supply), bipolar
-160LT	160 VDC (does not include transformer), unipolar, used with DP320XX
-320LT	320 VDC (does not include transformer), unipolar, used with DP320XX

Npaq 6U Series ORDERING INFORMATION

Bus Voltage (Vbus2) (Required) Configures the Bus Voltage for Vbus2

-0	Not wired
-10B	±10 VDC (200 W power supply), bipolar
-20B	±20 VDC (200 W power supply), bipolar
-30B	±30 VDC (600 W power supply), bipolar
-40B	±40 VDC (600 W power supply), bipolar
-60B	±60 VDC (600 W power supply), bipolar
-80B	±80 VDC (600 W power supply), bipolar
-160LT	160 VDC (does not include transformer), unipolar, used with DP320XX
-320LT	320 VDC (does not include transformer), unipolar, used with DP320XX

Controller Options (Required)

-ULTRA	6 axis control board
--------	----------------------

Npaq 6U Amplifiers (Required)

-DP32010E6U	Brushless motor driver, 320 V, 5 A cont., 10 A peak, 20 kHz PWM, 6U height, improved current feedback, requires A3200 software version 2.13 or greater
-DP32020E6U	Brushless motor driver, 320 V, 10 A cont., 20 A peak, 20 kHz PWM, 3U high drive (internal) with 6U front panel, improved current feedback, requires A3200 software version 2.13 or greater
-DP32030E6U	Brushless motor driver, 320 V, 15 A cont., 30 A peak, 20 kHz PWM, 3U high drive (internal) with 6U front panel, improved current feedback, requires A3200 software version 2.13 or greater
-DL40106U	Brushless motor driver, ±40 V, 5 A cont., 10 A peak, linear DC, 3U high drive (internal) with 6U front panel; actual continuous/peak current a function of motor resistance
-DL4005A6U	Brushless motor driver, ±40 V, 2.5 A cont., 5 A peak, linear DC with analog current loop, 3U high drive (internal) with 6U front panel; actual continuous/peak current a function of motor resistance
-DL4010A6U	Brushless motor driver, ±40 V, 5 A cont., 10 A peak, linear DC with analog current loop, 3U high drive (internal) with 6U front panel; actual continuous/peak current a function of motor resistance
-DL8010	Brushless motor drive, ±80 V, 5 A cont., 10 A peak, linear DC with analog current loop, 6U height; actual continuous/peak current a function of motor resistance; requires A3200 software version 4.04 or greater
-DL8020	Brushless motor drive, ±80 V, 10 A cont., 20 A peak, linear DC with analog current loop, 6U height; actual continuous/peak current a function of motor resistance; requires A3200 software version 4.04 or greater
-BLANK6U	6U high filler panel

Split Bus (Required)

-SPLIT BUS 1/2-6	Axis 1 Vbus1; Axis 2-6 Vbus2
-SPLIT BUS 1-2/3-6	Axis 1-2 Vbus1; Axis 3-6 Vbus2
-SPLIT BUS 1-3/4-6	Axis 1-3 Vbus1; Axis 4-6 Vbus2
-SPLIT BUS 1-4/5-6	Axis 1-4 Vbus1; Axis 5-6 Vbus2
-SPLIT BUS 1-5/6	Axis 1-5 Vbus1; Axis 6 Vbus2
-SPLIT BUS 1-6 (NO SPLIT)	Axis 1-6 Vbus1

Cooling Options (Required)

-FAN TRAY TOP	Fan tray mounted to top of Npaq 6U chassis; air flow directed down into the chassis
-FAN TRAY BOTTOM	Fan tray mounted to bottom of Npaq 6U chassis; air flow directed up into the chassis

Linecord (Required)

-ENGLAND	UK compatible line cord
-GERMAN	German compatible line cord
-ISRAEL	Israel compatible line cord
-INDIA	India compatible line cord
-AUSTRALIA	Australia compatible line cord
-US-115VAC	US 115 VAC line cord
-US-230VAC	US 230 VAC line cord
-NO-LINECORD	No line cord

Mounting Options (Required)

-SLIDES	Rack-mounted drawer slides
---------	----------------------------

Brake Options (Optional)

-BRAKE-z	Brake control logic and power supply; specify which axis "z" as 1, 2, 3, 4, 5 or 6
-BRAKEIO	Brake control logic and power supply; brake signal wired to miscellaneous I/O connector

Npaq 6U Series ORDERING INFORMATION

Line Filter (Optional)

-AC LINE FILTER AC line filter for reducing conducted emissions; required for CE

Options

-JI	4-way industrial joystick sealed for harsh environments; includes 1.5 m (5 ft) cable and three dedicated function buttons
-ENET	10/100 BASE-T Ethernet port
-ESTOP1	Internal ESTOP; controller decels motors to stop then bus power is removed; meets EN ISO 13849-1 Category 2, performance Level d capable; actual risk assessment is responsibility of user
-ESTOP2	Internal ESTOP; controller decels motors to stop then bus power is removed; meets EN ISO 13849-1 Category 3, performance Level d capable; actual risk assessment is responsibility of user
-ESTOP3	Internal ESTOP; controller decels motors to stop then bus power is removed; lethal voltage removed from Npaq in <1 second; meets EN ISO 13849-1 Category 3, performance Level d capable; actual risk assessment is responsibility of user
-S160-1	Shunt for Vbus1; 160 VDC operation
-S160-2	Shunt for Vbus2; 160 VDC operation
Note: Both shunts permitted for 160 VDC option.	
-S320-1	Shunt for Vbus1; 320 VDC operation
-S320-2	Shunt for Vbus2; 320 VDC operation
Note: Only one shunt permitted for 320 VDC option.	
-AIO	Analog I/O option; adds an additional four 16-bit analog inputs and six 16-bit analog outputs
Note: High speed digital I/O not available when selecting this option.	
-BC1	Additional bus capacitor for improved voltage sustain through variations in AC input

PSO Options (Optional)

-DUALPSO	Dual axis PSO
-TRIPLEPSO	Triple axis PSO
-PSO-NC	Normally-closed PSO output (default normally open)

Encoder Multiplier Options (Optional)

-MXR-1	4096x (16384 after quadrature) multiplier for 1 axis, 200 kHz input, 4096x real time output for PSO operation, 1 axis
-MXR-2	4096x (16384 after quadrature) multiplier for 2 axes, 200 kHz input, 4096x real time output for PSO operation, 2 axes
-MXR-3	4096x (16384 after quadrature) multiplier for 3 axes, 200 kHz input, 4096x real time output for PSO operation, 3 axes
-MXR-4	4096x (16384 after quadrature) multiplier for 4 axes, 200 kHz input, 4096x real time output for PSO operation, 3 axes max
-MXR-5	4096x (16384 after quadrature) multiplier for 5 axes, 200 kHz input, 4096x real time output for PSO operation, 3 axes max
-MXR-6	4096x (16384 after quadrature) multiplier for 6 axes, 200 kHz input, 4096x real time output for PSO operation, 3 axes max
-MXR2M-1	4096x (16384 after quadrature) multiplier for 1 axis, 2 MHz input, 4096x real time output for PSO operation, 1 axis
-MXR2M-2	4096x (16384 after quadrature) multiplier for 2 axes, 2 MHz input, 4096x real time output for PSO operation, 2 axes
-MXR2M-3	4096x (16384 after quadrature) multiplier for 3 axes, 2 MHz input, 4096x real time output for PSO operation, 3 axes
-MXR2M-4	4096x (16384 after quadrature) multiplier for 4 axes, 2 MHz input, 4096x real time output for PSO operation, 3 axes max
-MXR2M-5	4096x (16384 after quadrature) multiplier for 5 axes, 2 MHz input, 4096x real time output for PSO operation, 3 axes max
-MXR2M-6	4096x (16384 after quadrature) multiplier for 6 axes, 2 MHz input, 4096x real time output for PSO operation, 3 axes max

Line Select Options

-LINESEL-INT	User selectable input voltages; internal switch access
-LINESEL-MX-INT	User selectable input voltages, for MXR option; internal switch access
-LINESEL-EXT	User selectable input voltages; external access to switches through holes in the Npaq cover
-LINESEL-MX-EXT	User selectable input voltages, for MXR option; external access to switches through holes in the Npaq cover

Motor Output (Required)

-M1	Npaq 1 axis motor output
-M2	Npaq 2 axis motor output
-M3	Npaq 3 axis motor output
-M4	Npaq 4 axis motor output
-M5	Npaq 5 axis motor output
-M6	Npaq 6 axis motor output

Note: Must be greater than or equal to the number of amplifiers in the system.

Npq 6U Series ORDERING INFORMATION

Resolver (Optional)

-RDP2-y	1-2 axis RD converter board; must be on axis 1-2
-RDP4-y	1-4 axis RD converter board; must be on axis 1-4
-RDP6-y	1-6 axis RD converter board

Note: Where y is the carrier frequency. Options are 5, 7.5 or 10 kHz.

Integration (Required)

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

-TAS	<p>Integration - Test as system Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.</p>
-TAC	<p>Integration - Test as components Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.</p>